

**Draft Report of the
MAINE BROADBAND ACCESS
INFRASTRUCTURE BOARD**



November 2005

**SUBMITTED TO THE TELECOMMUNICATIONS
INFRASTRUCTURE STEERING COMMITTEE**

TABLE OF CONTENTS

| | |
|---|----|
| TABLE OF CONTENTS | 2 |
| EXECUTIVE SUMMARY | 3 |
| INTRODUCTION | 4 |
| BACKGROUND AND RECOMMENDATIONS | 7 |
| Incentives and Funding | 11 |
| Increase Awareness and Demand | 13 |
| Expansion Projects | 14 |
| Broadband Development Authority | 17 |
| APPENDIX A – Taxation Policy | 20 |
| High-Technology Investment Tax Credit | 20 |
| Telecommunications Property Tax..... | 20 |
| APPENDIX B – Subcommittee on Technology and Means of Delivery | 22 |
| APPENDIX C – Sub-Committees and Goals..... | 26 |
| APPENDIX D – Other States | 29 |
| APPENDIX E – Regulatory and Financial Assessment Committee | 30 |
| GLOSSARY | 31 |

EXECUTIVE SUMMARY

The State should recognize that access to broadband services is a necessity. It is critical to the ability of Maine citizens, businesses, and institutions to participate in our global economy, to create, enhance, and preserve local economic development and employment opportunities, and to retain our human capital.

As reflected in the Governor's Executive Order, our State goal should be to achieve universal broadband service available to all citizens, businesses, and institutions by 2010. "Universal" does not necessarily mean 100%, as there may always be instances where service cannot reasonably be provided to extremely remote locations. Nevertheless, it certainly means a very high percentage of availability, in the range of at least 95-98%. To be meaningful, universal service also requires that the service be affordable and the quality of service (bandwidth, reliability, synchronicity, and security) available to home, business, and large users be adequate and comparable to what is available in other regions of the country. Quality standards are not static; they will increase over time as technology and demand create higher levels of need. Further, the broadband needs of small businesses are typically greater than the need of residential customers, and the needs of large enterprise/institutional users greater still. For example, adequate broadband bandwidth to a residential user in Maine today could be in the range of 1.5 to 3.0 Mbps downstream and 256 to 784Kbps upstream, whereas a large institutional user may require 100 Mbps symmetrical or more.

Our primary recommendations for achieving universal broadband service are:

1. Provide Incentives and Funding for Projects
2. Increase Awareness and Demand
3. Develop Expansion Projects
4. Create a Broadband Development Authority

INTRODUCTION

The Broadband Access Infrastructure Board was originally created pursuant to Executive Order 41 FY 04/05 (dated May 6, 2005). “The Board will focus on how to expand the availability of broadband services throughout the State to private homes, businesses, public and private educational institutions, research centers, and other entities that would benefit from such services. The Board’s objective will be to provide for universal broadband access by 2010.”

This board is one of three boards created by the Governor to advance the goals of his *Connect Maine* initiative. From the Governor’s 2005 State of the State address: *Tonight I am announcing “Connect Maine.” A broad and aggressive telecommunications strategy for this State. Connect Maine will give nearly every Mainer the opportunity to plug into the global economy from their community. It will ensure that 90% of Maine communities have broadband access by 2010... ”*¹

The Board believes that the only goal that will make Maine competitive is “universal access to infinite bandwidth.” The competitiveness of any state in the union depends in no small part on its ability to promote the growth of high-technology business and commerce that accompanies high-speed data connectivity, a crucial component of which is universally available, secure, affordable, scalable, high-bandwidth access to the internet. Only a state that is a supremely attractive place to conduct business, to shop, and to participate in an increasingly online culture will be able to staunch the exodus of youth and brainpower that is of such grave concern in Maine.² A well-conceived strategy will take into account the three tiers of broadband

¹ State of the State Address by Governor John E. Baldacci, January 25, 2005.

² Presiding Officers’ Advisory Task Force On Creating A Future For Youth In Maine, January 2004, Recommendation #11, “Implement Universal Rural Broadband Access Statewide.”

consumers, what we have termed home, businesses, and enterprise. It will further address three major levels of infrastructure: the connectivity of ‘big pipes’ or ‘backbone’ into the state; interregional connectivity from the backbone to the various towns and cities; and finally, intraregional connectivity that bridges those nodes to the individual home or business premises.

The board divided its responsibilities into separate subject areas and created three subcommittees to cover the subject matter in detail: Service Availability (“Where We Are Now”), Technology and Means of Delivery, and Regulatory and Financial Assessment, and Expansion Plan (“How We Get There”). Each subcommittee has met regularly since July.

The subcommittees of the Broadband Infrastructure Access Board reviewed extensive information regarding current availability of broadband service, funding mechanisms and regulatory issues, and delivery mechanisms and technologies. The ideas from the subcommittees are incorporated in these recommendations with specific subcommittee resources (charts and tables) attached as appendices.

There are basic fundamental issues that must be addressed in order to make progress. These “basics” can be classified as follows: 1) lack of available bandwidth (or no advanced telecommunications services available); 2) lack of bandwidth at affordable prices and with quality service (or inadequate market economics); and 3) lack of information on where broadband services are available (specific site location and installation timing information). The problem of “lack of information” is not a root problem itself the way the lack of broadband is; rather, it is a barrier to effective creation of solutions because it is very difficult to efficiently

apportion resources for expanding broadband connectivity if nobody knows exactly where the greatest and least need exists. Unlike the first two “basics,” it is difficult for a Board such as this one that is made up of entities that compete with each other on a day-to-day basis to obtain granular market information. Lack of information for potential users also makes planning decisions more difficult.

BACKGROUND AND RECOMMENDATIONS

According to the Michigan Economic Development Council, “[i]mproving access to high-speed telecommunication services is the most important state economic infrastructure issue for the new century. Whether for business, government, healthcare, or educational purposes, higher speed ‘broadband’ access is increasingly becoming a necessity – not a luxury.”³ This Board would go even further to say that broadband access IS a necessity.

The current availability of broadband service in Maine has been the subject of study by the members of the Service Availability subcommittee for the last several months. First, “broadband” had to be defined. This subcommittee decided to concentrate on “basic” broadband service that provided at least 1.5Mbps downlink and 256Kbps uplink bandwidth.

PUC Staff solicited availability data from providers by emailing a letter and protective order to all DSL, cable and wireless providers⁴ that contained the following request:

From ILECs, CLECs and ISPs:

1. The location of each Central Office or Remote Terminal that is capable of serving DSL to customers as of September 1, 2005.
2. The locations you plan to be capable of serving by September 1, 2006.

From Cable Companies:

³ “LinkMichigan” Policy Paper, Michigan Economic Development Council, May 14, 2001.

⁴ All providers that we were aware of at the time. We expect that there were providers, in particular small wireless companies that were unintentionally and inadvertently left out.

1. The streets on which you are capable of providing cable modem service as of September 1, 2005.
2. The streets you plan to be capable of serving by September 1, 2006.

From Wireless Companies:

1. The location of your towers capable of providing broadband service and their service radius as of September 1, 2005.
2. The locations you plan to be capable of serving by September 1, 2006.

From Electric Companies

1. Locations where you are capable of providing broadband service over powerlines as of September 1, 2005.
2. The locations you plan to be capable of serving by September 1, 2006.

We also solicited information from municipalities. We have not heard from 100% of towns, but to date, only one (Ellsworth) has responded in the affirmative to the question “do you provide high speed internet to your citizens”.

The analysis we could do is only as good as the data we received, and the data is not perfect. The only way to get a completely accurate count of the number of homes that have and

do not have broadband would be to conduct a house-to-house survey. For example, DSL is generally available 18,000 feet from a telephone central office or remote terminal that has the required equipment. For purposes of this analysis we assumed a 15000 foot radius around the central offices or remote terminal that we knew to be DSL equipped (allowing for the fact that not all roads radiate directly from the CO). However, we know that there are homes within the 15000 feet that cannot get DSL because of technical problems with the loop to the house (e.g., load coils).

We have a similar limitation with the data from wireless providers. Their signal is generally available within an X mile radius from their tower/equipment but that assumes that it is traveling over flat land. An obstacle such as mountain would significantly reduce the service area. There is also a significant limitation to the cable data. Cable companies are franchised by municipality. However, within any municipality there will likely be a road or roads where the cable company does not deploy facilities. In order to exclude these homes, we would have to invest significant time and materials into the study.

Given these limitations, a best effort estimate is that as of September 1, 2005, over 170,000 Maine residents do not have access to broadband service, which equates to nearly 75,000 households. Which means that approximately 14% of Maine households do not have access to basic broadband service.⁵ This 14% is spread over the entire state, largely in sparsely

⁵ 2000 Census, Maine State Planning Office, (Total occupied housing units = 518,200, population = 1.275M, 2.39 = average household size).

populated areas.⁶ The largest census blocks with absolutely no broadband are in Jonesport, Holden, Mexico, Howland, and Paris. There are also several towns with virtually no service, such as: Appleton, Somerville, Northport, Georgetown, Orland, Penobscot, Eastbrook, Lebanon, Industry, Weld and Athens.

Despite the limitations of the data, it is clear that there is work to be done in reaching our goal of “universal access to infinite bandwidth”

For purposes of this report and to develop long-term policies the Broadband Access Infrastructure Board decided that there are three general tiers of data communications consumers: Home, Business, and Enterprise, whose needs in terms of bandwidth, speed, reliability, and speed of data communications are illustrated in the table in Appendix B. A bandwidth requirement for all three classes is a rapidly moving target, and the direction is always upward with a steep rate of increase. It is difficult to pin down a solid number. For example, the Federal Communications Commission (FCC) classifies an Internet connection of 200kbps as “broadband” without reference to whether that speed is upstream or down. That standard is considered by this Board to be woefully out-of-date. Contrast this figure with what today’s typical broadband consumers of DSL are tolerating, but beginning to chafe at: speeds of 3Mbps down and 512kbps up. Therefore, we recommend that policies enacted as part of this comprehensive program either not make reference to specific speeds or be regularly and carefully revised.

The Broadband Access Infrastructure Board therefore, has four recommendations:

⁶ In providing the PUC with the data, the carriers required that the PUC agree not to disclose the map.

1. Provide incentives and funding for broadband infrastructure.
2. Increase awareness and demand for broadband services.
3. Develop Expansion Projects
4. Create a “Broadband Development Authority”

Incentives and Funding

Without a coordinated and effective national policy and resource commitment regarding broadband, states need to construct their own, specific and targeted broadband expansion policies.⁷ The Board discussed many possibilities for this policy. Some recommended policies that may “advance the ball,” but not require substantial amounts of public funds. Others, however, would require substantial investment in infrastructure, much like for public highways.

The Board has determined that we should encourage expansion in a technology-neutral and competitively fair manner. In the more rural areas of the state there likely will be a wireless solution. We should provide “gap” funding to those providers and fund programs that increase the visibility and demand for broadband. Current USDA/RUS low-interest loan programs are available but little used in Maine. We should increase awareness of these programs and use state funds to help meet the USDA/RUS 20% match requirements and the state should create new low-interest loan programs for broadband investment.⁸

⁷ There is Federal policy that provides for USDA/RUS broadband funding and a number of proposed pieces of Federal legislation that explicitly deals with broadband.

⁸ The Office of Community Development, DECD, with support from the PUC, was suggested, also FAME has experience with loan programs.

The state should provide a mix of tax credits and direct state funding, possibly funded through a bond issuance (see LD 806, “An Act to Authorize A General Fund Bond Issue To Encourage Rural High-Speed Internet Access,” from last legislative session), for incremental and stand alone capital investments to provide broadband service to unserved or underserved areas. The existing High-technology Investment Tax Credit program should be reviewed and revised with legislation to allow both major (telecommunications and cable companies) and minor broadband service providers to access the tax credits for incremental infrastructure investment. The definition of “high-technology activity” needs to be adjusted, as well as the definition of “eligible equipment” to allow the widest applicability for real broadband expansion. This tax credit program would be more utilized with better promotion of its availability. ⁹

Taxation Policy: ¹⁰ Many policy experts equate the rural deployment of broadband access to the rural electrification efforts of the early 20th Century. In the case of electricity, the federal government was an active partner in the rollout of service to the rural regions of the U.S. The government subsidized the infrastructure resulting in the nationwide deployment of household electricity. The question that remains is whether the development of broadband rises to the same level of necessity as electricity. To subsidize a non-necessity would utilize public money to finance private market endeavors.

In Maine, two major taxation steps have been taken by state government to assist telecommunications development and high technology investment. This tax policy is an example of a tempered response to the taxation questions posed above. The high technology investment tax credit and the rescheduling of the telecommunications property tax have assisted the growth of telecommunications infrastructure without infringing upon natural market forces. Maine State Government has taken prudent and effective course through this policy arena. Looking at the two tax policy shifts give a good picture of a high technology friendly state, which allows competitive market forces to command the natural rate of investment and deployment (See Appendix A for more detail).

⁹ 36 M.R.S.A., § 5219-M

¹⁰ THE NEXT STEPS TOWARD THE LAST MILE, Prepared for the 120th Maine Legislature, Joint Standing Committee on Business and Economic Development, Joint Standing Committee on Utilities and Energy. Prepared by the Telecommunications Working Group, December 5, 2001

Target areas for expansion would be identified and broadband investments solicited through a competitive RFP process open to any provider, managed by the Broadband Development Authority with administrative assistance from the PUC, including telecom and cable companies. The RFP would be technology neutral and would select the provider able to provide the highest level of service in the targeted area at the lowest cost.

We also recommend that, similar to recommendations from the WTIB, that broadband providers be allowed access to state towers, facilities, and rights of way.¹¹ Access to the Maine Universal Service Fund should also be considered. The MUSF should be bifurcated into two parts by PUC rule. One section to provide high cost support for rural incumbent telecommunications companies and the other to provide funding for cellular tower construction, direct broadband facility construction, and debt service on broadband development bonds. The challenge will be to develop an MUSF assessment method that more accurately reflects the communications needs of the state. Currently, only telecommunications companies pay into the fund. An RFP process should be used to determine need and providers.

Increase Awareness and Demand

Many of the current providers have stated that part of the economic calculation for determining where to install new infrastructure is the expected return based on the expected take rate. In many cases take-rates are less than 10% and often less than 20% of the households

¹¹ Promoting Broadband Access Through Public Rights-of-Way and Public Lands, NARUC, July 31, 2002.

where some form of broadband is available¹². Increasing the awareness and then the expected take-rates would “lower” the threshold for deciding where to place broadband investments.

The Board discussed many ideas to increase the public's awareness of the need for and uses for a broadband connection at home such as: a public education program involving PSA's, media events¹³; Considering telecommuting programs for state and local employees; provide more state and local government services on-line (perhaps with discounts or incentives for on-line use); We recommend that the Broadband Development Authority study these ideas in more depth and be authorized to implement these programs.

(include a few detailed examples of other states' programs, see appendix D)

Expansion Projects

Provide state grant funding for broadband technology demonstration projects in unserved or underserved areas. Develop RFP process to enable all providers, and technologies to participate. A “Citizen's Advisory Board,” with assistance from the PUC and the Broadband

¹² We have found very few examples of other states addressing broadband availability from the take-rate perspective. The “ConnectKentucky's” plan refers to public education but does not outline any specific programs.

¹³ The Canadian “Community Access Program” that provides public internet access using wireless hotspots in rural and remote areas could be a model for a statewide awareness publicity program focusing on wireless hotspots.

Development Authority, will develop a list of projects that will be eligible for funding, either in whole or to fill gaps. Municipalities and cooperative groups should be encouraged to develop projects, especially using wireless technologies.¹⁴ While some states have limited or prohibited municipalities from providing broadband access systems, the Maine Legislature acknowledged that Maine cities and towns already have that authority under the “home rule” provisions of the state constitution. LD 1128 was proposed to clarify that authority, but the language was removed as unnecessary.¹⁵

The BDA will administer a pool of financial incentives for broadband expansion. The pool will include:

- a. Access to existing and new low-interest loan programs for broadband expansion, along with direct State funding of part or all of required loan match contributions. The BDA would facilitate awareness and access to existing loan programs such as the USDA RUS program and the State would fund additional low-interest loan programs.
- b. State and local personal property tax exemptions for incremental broadband investment in unserved and underserved areas, if the BDA certifies the

¹⁴ Any municipality that seeks to participate in the RFP should be required to offer a local TIF on property devoted to the incremental build-out and offer local tax incentives to the same degree that the state is willing to provide tax incentives.

¹⁵ See proposed legislative examples from the last session: LD 806, An Act to Authorize a General Fund Bond Issue to Encourage Rural High-speed Internet Access; LD 1128, An Act Directing the State Planning Office to Study Municipal Capabilities to Become Providers of Internet Services; LD 1440, An Act to Encourage the Implementation of High-speed Internet Access in Rural and Isolated Areas.

investment as eligible. For equipment and facilities subject to local personal property taxes, the municipality must consent to the project's eligibility.

- c. State sales and use tax exemptions for certified incremental broadband investment.
- d. Eligibility for the High Technology Investment Tax Credit for certified incremental broadband investment.
- e. Direct State grant funding for certified incremental broadband investment. Grant funding would be provided through a bond issuance. Bonds could be State general obligation bonds or secured through a pledge of future USF funds.

The BDA will identify areas of the State that are unserved or where there is inadequate available broadband service. The BDA will also identify any needs for investment in large capacity broadband facilities or interregional broadband infrastructure. Communities, businesses and institutions will be encouraged to submit broadband investment proposals with an appropriate needs analysis, including any proposed local funding or support mechanism or commitment from users to take service over a specified term.

The BDA will determine which identified broadband infrastructure needs are unlikely to be met by market participants without support. The BDA will develop a prioritized list of needed broadband expansion projects that require financial support. The BDA will solicit market participants and other potential investors, through an open competitive RFP process, to propose broadband infrastructure investment for identified project areas and to bid for a mix of

incentives listed above to make the investment viable. The RFP process will be technology and provider neutral, available to all providers with demonstrated financial and technical capability and to all broadband technologies with demonstrated performance. Municipalities, non-profit entities, and cooperatives would be eligible to participate. The BDA will select the highest value proposal to fund a particular broadband expansion project, being the proposal that provides the highest level of broadband service in the target area at the lowest subsidy cost.

Broadband Technology Demonstration Projects. The BDA would also administer and provide funding on a competitive basis to certified broadband technology demonstration projects in Maine.

Broadband Development Authority

The Legislature should create a permanent development authority to implement State broadband policy (Broadband or “ConnectME,” Development Authority). The authority would draw from expertise in several existing State agencies, including DECD, Office of Innovation,¹⁶ OIT, SPO, and the PUC, but it would be primarily staffed by and housed within a single agency, such as the PUC. The authority, directly or through its parent agency, would have rulemaking authority and access to a professional staff. It would be independent of competitive providers of broadband services. The authority would monitor broadband deployment in Maine, maintain, and publicize information on broadband availability, demand, and funding mechanisms. It would obtain and maintain current data and maps on broadband availability in all locations of the State. It would study and recommend regulatory changes to enhance broadband deployment in

¹⁶ <http://www.maineinnovation.com/>

Maine. It would also identify unserved and underserved areas of the State, solicit proposals for broadband expansion projects, demonstration projects and other initiatives, and administer the process for selecting and specific broadband projects and providing incentives.

However, a bold organizational change would be to create a Cabinet-level position to provide a statewide strategic and tactical coordination for telecommunications and information technology purchasing, systems, services, and staffing. Unify all state technology resources, including the Broadband Development Authority, under one office and establish an aligned information technology vision and mission for the state. This would facilitate the state being an anchor tenant and demand aggregator for broadband services.¹⁷

The authority should be the repository of information regarding funding sources, service locations and availability, as well as planning assistance and analysis tools. For example, knowing where communications infrastructure is located and the capacity or quality would assist companies contemplating relocation and municipalities in planning and budgeting.

The authority should also establish a “Broadband Infrastructure Clearinghouse” mechanism to aggregate data on available telecommunication infrastructure and services and provide a source of alternative information on broadband options and available infrastructure.

Developers and others planning for their telecommunications needs must have access to information that lets them know what is available where, with specific information on timing expectations for service installation. Another concern stems from the large amount of uncoordinated infrastructure being installed across the state. Utilities, railroads, and others have installed fiber and advanced switching capabilities across the state with little or no knowledge of government officials. If unregulated, there are currently no requirements to report such investment, even if such infrastructure is leased to a retail carrier. With similar concerns, the states of Oregon, Pennsylvania, and Tennessee have implemented laws compelling telecommunication and information

¹⁷ Proposed by the PK-20 Telecommunications and Technology Infrastructure Board

vendors to provide information about their network capabilities and the locations where advanced services are available (from LinkMichigan report).

The broadband development authority should recommend longer-term regulatory changes to be implemented through either legislation or rulemaking at the PUC. A number of BAIB members and subcommittees discussed regulatory flexibility and neutrality, but no specific recommendations are offered. Some also recommended changes to the method of video service franchising, but that idea seems to be somewhat contentious and does not appear to contribute to increasing broadband availability.

The Board suggests that the Governor create a cabinet-level position to provide statewide strategic and tactical coordination for telecommunications and information technology purchasing, systems, services, and staffing. Unify all state technology resources under one office and establish an aligned information technology vision and mission for the state.

APPENDIX A – Taxation Policy¹⁸

Many policy experts equate the rural deployment of broadband access to the rural electrification efforts of the early 20th Century. In the case of electricity, the federal government was an active partner in the rollout of service to the rural regions of the U.S. The government subsidized the infrastructure resulting in the nationwide deployment of household electricity. The question that remains is whether the development of broadband rises to the same level of necessity as electricity. To subsidize a non-necessity would utilize public money to finance private market endeavors.

In Maine, two major taxation steps have been taken by state government to assist telecommunications development and high technology investment. This tax policy is an example of a tempered response to the taxation questions posed above. The high technology investment tax credit and the rescheduling of the telecommunications property tax have assisted the growth of telecommunications infrastructure without infringing upon natural market forces. Maine State Government has taken prudent and effective course through this policy arena. Looking at the two tax policy shifts give a good picture of a high technology friendly state, which allows competitive market forces to command the natural rate of investment and deployment.

High-Technology Investment Tax Credit

First enacted in 1997 by the 118th Maine Legislature, the high-tech tax credit was designed to attract businesses to Maine involved in computers and the Internet. If the state could entice high-tech enterprises to base operations in Maine, higher skill, higher paying jobs would be available to residents. The credit was amended by the 120th Legislature, redefining the requirements to qualify, after realizing the credit encompassed a much wider group of businesses than originally intended.

The credit is equal to the adjusted basis of eligible equipment on the date first placed in service in Maine. The eligible high-tech activities range from design and manufacturing computer software, equipment, and supporting communications components to the provision of Internet access services and advanced telecommunications services. Generally, the credit may not exceed \$100,000 per year, unless current-year credit base is less than \$100,000, in which case, previous years' carryover up to \$200,000 may be allowed.

This tax credit program is very helpful to businesses making significant capital investment in Maine. Moreover, the credit entices investment by smaller companies who may not ordinarily make a large investment in infrastructure.

Telecommunications Property Tax

With the further intent of encouraging capital investment in telecommunications infrastructure, the 119th Maine Legislature began to adjust the tax rate schedule on telecommunications personal

¹⁸ THE NEXT STEPS TOWARD THE LAST MILE, Prepared for the 120th Maine Legislature, Joint Standing Committee on Business and Economic Development, Joint Standing Committee on Utilities and Energy. Prepared by the Telecommunications Working Group, December 5, 2001

property. The mil rate will remain at the current level of 27 mills for property assessed before December 31, 2002; however, the rate will reduce over a period of seven years.

| | |
|--------------------------------------|----------------------|
| For assessments made in 2003 | -----26 mills |
| For assessments made in 2004 | -----25 mills |
| For assessments made in 2005 | -----24 mills |
| For assessments made in 2006 | -----23 mills |
| For assessments made in 2007 | -----22 mills |
| For assessments made in 2008 | -----21 mills |
| For assessments made in 2009+ | -----20 mills |

This reduction in property tax, over time, will make capital investments more attractive to telecommunications companies. These investments will provide additional advanced services to the consumer, improving connectivity to Maine citizens.

The Legislature, with the support of the current Administration, has made significant progress in providing tax relief to the telecommunications industry with the hope that continued capital investment occurs in Maine. Clearly, with several hundred million dollars of recent and planned investments in Maine, the telecommunications industry is committed to the improvement and expansion of current networks.

APPENDIX B – Subcommittee on Technology and Means of Delivery

**BROADBAND ACCESS INFRASTRUCTURE BOARD
Report to Expansion Plan Committee
from Subcommittee on Technology and Means of Delivery**

Introduction

The primary task of the Broadband Access Infrastructure Board Subcommittee on Technology and Means of Delivery (BAIB-TMD) is to analyze and present the current range of physical modalities for the provision of high-speed Internet access. Our secondary task is to issue our recommendations for how these technologies might be implemented in the state of Maine or, if they are already in use here, how they might be expanded, enhanced, and optimized for greater efficiency.

Some of these modalities have a clear and established track record (e.g., cable, Digital Subscriber Line [DSL] service, Wi-Fi [802.11x]); others, such as Broadband over Power Lines (BPL) and Wireless Interoperability for Microwave Access (WiMAX), use technologies neither in final form nor in widespread use but are presently undergoing testing. Finally, there are services such as Integrated Synchronous Digital Networking (ISDN) that are falling into disfavor but which are listed on this continuum for the sake of comparison.

We have highlighted here some of the major advantages and disadvantages of each technique. It is widely and correctly observed that technology changes at a very rapid pace, often with rather tight cycles of innovation and obsolescence. Accordingly, an assessment of a particular technique of delivering broadband access today may not apply tomorrow. Therefore, a nimble and technology-neutral approach is the most likely to succeed, informed by lessons learned through the use of the technologies of yesterday and today.

The Challenge at Hand

The purpose of this matrix is “more descriptive than prescriptive.” It is the consensus of the Subcommittee that it ought not to be the task of Maine lawmakers to choose from among these modalities for a single, be-all-and-end-all solution for achieving the Governor’s goals vis-à-vis broadband. We foresee the most likely scenario as involving different means of delivery depending on the population density and current need of a particular area. Therefore, the best solution will emerge from an integrated, multilayered, tightly coordinated approach. In sparsely populated areas, wherein lies the greatest difficulty and most acute need in Maine, it seems clear that some form of wireless broadband is called for in many if not most situations.

Data communications is vital to the development of economic activity, the delivery of educational services, the participation of citizens in civil affairs and effective government. If Maine and its citizens are to thrive and compete in the society and economy of the twenty-first century, we need to have a network for all the state which is at least equal and hopefully superior to that found in other states and countries. The most likely means of reaching this goal is to create an environment in which all potential providers are actively working toward building new

capacity and improving the current infrastructure. To make that happen, we will need to examine all of the obstacles standing in the way of this objective, be they related to regulation, financing, taxation, etc.

Analysis

There are three general tiers of data communications consumers: Home, Business, and Enterprise, whose needs in terms of bandwidth, speed, reliability, and speed of data communications are illustrated in the table below:

Relative Needs of Three Classes of Data Consumers

| | Home | Business | Enterprise |
|-------------------------------|--|---|--|
| Description | The least demanding category. Usually consists of <u>single individual or family</u> in a residential setting. | This moderate-needs category includes most <u>small-to-medium-size businesses</u> and organizations. | The most demanding group, which includes the <u>largest companies with multiple sites; hospitals, universities, and government agencies.</u> |
| Bandwidth Requirements | Moderate. | Moderate to High. | Very High. |
| Synchronicity | Moderate. Asymmetrical bandwidth (upstream speed much lower than downstream speed) is generally acceptable at present but that tolerance may not last. | Moderate to High. Requires considerably more symmetry than Home users. | Absolute. Speeds must be equal both upstream and downstream. |
| Reliability | Relatively low. High uptime desirable but not usually guaranteed. | Moderate to High. More money, people, time, and resource are involved and so reliability needs are greater than Home users. | Highest possible. When an Enterprise data connection slows down or fails completely, negative effects are wide-ranging. |
| Security | Relatively low. Most security measures are the responsibility of the customer, not the provider. | Moderate to High. Identity theft is an ever-present concern. Businesses need to protect their customers and themselves. | Highest possible. Consequences of failure can be disastrous. |

A well-designed and properly executed Expansion Plan must take into account the needs of all three consumer classes.

In addition, there are two general aspects of the delivery equation: *inter*-regional and *intra*-regional connections. The former, inter-regional connection, brings broadband access from the backbone to and from a particular town via a backhaul. The latter, the intra-regional connection, distributes the signal to and from various locations without the town. These are two separate problems requiring different solutions. Solving the inter-region connection problem would do much to remedy the low population density inhibitor cited above. Existence of a cost-effective inter-region connection to a town would make the formation of municipal networks or commercial competitive service offerings for the distribution of services within towns economically viable. Dedicated wireless/microwave may be suited to moderate inter-region connections, but have physical limitations and limited bandwidth. All the other long-haul technologies are wired, thus amenable to a fiber-optic medium. Because of its capacity and

future-proof technology, dark fiber may be the best inter-regional connection technology. However, even dark fiber may be supplanted by passive optical networking (PON) or gigabit passive optical networking (GPON), so that issue must be approached with caution. Whatever the particular technology, an investment in providing very high-speed wired connections, making it available for lease by service providers would be a wise use of public money in line with what is being done in a handful of other forward-looking states.

The problem of distribution within a town may be solved using any of the short haul technologies in the broadband technology matrix. Different ones may be better suited to the physical, demographic, and market challenges inherent in each region and town. However with the inter-region connection problem solved by dark fiber the competitive landscape is improved, making service options for distribution available.

Conclusions and Recommendations

It is clear that in a large, sparsely populated state such as Maine, no single method of delivery of high-speed data access will work well in every region. For relatively dense regions, dark fiber appears to be the most promising and future-proof means of delivery at present, with variants of DSL and cable technology as reasonable second-tier alternatives to fiber. For the less-dense and truly remote areas of the state, some form of wireless broadband delivery appears to be the most workable and cost-effective solution, whether it be a long-distance application of Wi-Fi (802.11x), WiMAX (802.16x), and whether it is fixed or mobile will depend on emerging and/or current market conditions. Accordingly, whatever policies or regulations are enacted at the state level must be sufficiently elastic to accommodate a rapidly changing marketplace for hardware and delivery systems.

It is clear that Maine absolutely requires a comprehensive plan for expanding the data-connection capacity of the state by means that are affordable, universally available, sustainable, and scalable. The resulting initiative can be modeled on initiatives already underway in others states. For example, the nonprofit North-Link program devotes \$10 million to build a 400-mile fiber-optic backbone network spanning six Vermont counties that will be leased by the state to Internet Service Providers. Similarly, in Virginia, the Southside Regional Broadband Initiative (previously called Regional Backbone/Roots of Progress) commits \$12 million to build a 700-mile fiber-optic network connecting five cities, 20 counties and 56 industrial parks in southern Virginia. It is clear that Maine needs something on this scale or even larger.

Specific Recommendations

1. A bandwidth requirement for all three classes is a rapidly moving target, and the direction is always upward with a steep rate of increase. It is difficult to pin down a solid number. For example, the Federal Communications Commission (FCC) classifies an Internet connection of 200kbps as “broadband” without reference to whether that speed is upstream or down. That standard is consider by this Subcommittee to be out-of-date. Contrast this figure with what today’s typical broadband consumers of DSL are tolerating, but beginning to chafe at: speeds of 3Mbps down and 512kbps up. Therefore, we recommend that policies enacted as

part of this comprehensive program either not make reference to specific speeds or be regularly and carefully revised.

2. Create a permanent agency devoted to expanding broadband and providing information on broadband to the public, similar to the Vermont Broadband Board.

3. Examine (and, if necessary, revise) the Utility and Railroad Services Maine Utility Accommodation Policy to ensure that it is broadband friendly and that it takes advantage of “piggybacking” to help avoid the cost of duplicate labor, i.e., when road construction is being performed by the Maine Department of Transportation (MDOT), a simultaneous effort to lay fiber cabling could be done while the ground is already being worked.

APPENDIX C – Sub-Committees and Goals

Broadband Access Infrastructure Board Sub-Committees and Goals July 14, 2005

The Board will focus on how to expand the availability of broadband services throughout the State to private homes, businesses, public and private educational institutions, research centers, and other entities that would benefit from such services. The Board’s objective will be to provide for universal broadband access by 2010. (Executive Order)

Goals:

Improving access to high-speed telecommunication services is the most important state economic infrastructure issue for the new century. Whether for business, government, healthcare, or educational purposes, higher speed “broadband” access is increasingly becoming a necessity – not a luxury.

No state plan to improve infrastructure will be able to completely address all of the service problems and issues identified by this board. However, there are basic fundamental issues that must be addressed in order to make progress on all fronts. These “basics” can be classified as follows: 1) lack of available bandwidth (no advanced telecommunications services available); 2) lack of bandwidth at affordable prices and with quality service (inadequate market economics); and 3) lack of information on where broadband services are available (specific site location and installation timing information).

Subcommittees (first listed member is chair):

- 1) Service Availability Subcommittee – “Where we are now.”

The Service Availability Subcommittee will investigate and report on the following:

- a) Identify the current providers of broadband services in the State, the coverage area of each provider and the current penetration of each;
- b) Identify the resources that providers have dedicated to the expansion of broadband services;
- c) Identify regions in the State where broadband services is unavailable or where service characteristics or price are problematic;
- d) Identify regions that would benefit from broadband service; and
- e) Identify current broadband expansion efforts and the expected increased services and penetration associated with each.

Questions: Should there be requirements on all telecommunications and information carriers (both those currently regulated and unregulated) to provide specific network location and capability information? In addition, should quality of service standards should be developed and enforced so that businesses and

other purchasers of advanced telecommunication services are able to plan and not have business operations disrupted because of installation delays?

Members: **Reggie Palmer**, Kathy Hounsell, Peter Reilly, Brian Paul, Amy Spelke.

2) Technology and Delivery Mechanisms Subcommittee.

The Technology and Delivery Mechanisms Subcommittee will investigate and report on the following:

- a) Identify the types of broadband services available in the State, including the characteristics of each type of service such as typical available bandwidth and cost;
- b) Identify the benefits and drawbacks of the various available broadband technologies and delivery mechanisms, including service and cost considerations;
- c) Identify cost and technological barriers to expansion of various broadband service mechanisms to unserved or underserved areas of the State;
- d) Identify the cost of expanding broadband services into areas that presently do not have such services;
- e) Evaluate competing and emerging broadband technologies in relation to differing topography, population density, and other constraints encountered around the State of Maine;
- f) Recommend the types of technology best able to provide service to those areas that need it the most. Distinguish between lower (residential and small businesses) bandwidth needs and the higher requirements of institutional and large businesses;
- g) Identify how broadband services could be used in unserved or underserved areas of the State.

Members: **Sam Elowitch**, Fletcher Kittredge, Scott Morrison, Gerry Dube
Chris Johnson, Phil Lindley/Amy Spelke.

3) Regulatory and Financial Assessment Subcommittee.

The Regulatory and financial assessment Subcommittee will investigate and report on the following:

- a) Identify current federal, State or local regulatory policies, requirements or barriers that promote, impede or affect the deployment of broadband services, including the “One Gigabyte Initiative” and open access legislation and their impact on availability of broadband services;
- b) Identify current funding sources for broadband infrastructure investment, such as Federal loans and grants and other federal, State or local government incentives;

- c) Identify potential investors and partners willing to increase broadband penetration;
- d) Calculate the economic impact that increased broadband penetration would have on the State, and identify how this impact would benefit the investors who undertake to expand their broadband coverage;
- e) Recommend legislation regarding state taxes (property, income, BETRS, PTZs), franchising and fees, certifications, affiliated interest transactions, ROWs, and access to information resources. Consider other tax incentives and infrastructure grants for low-use communities.

Questions/comments. We should strive for tax and permitting fairness. Differing rules discourage investment. From a business climate standpoint, why should different carriers have to play by different rules? A level playing field for ALL (regulated and non-regulated) broadband carriers should be established – including, but not limited to, competitive local exchange carriers, incumbent local exchange carriers, long distance/long haul carriers, resellers, wholesale (dark fiber) carriers, wireless carriers and cable modem or “advanced” telecommunication cable service providers (excluding traditional cable television service).

Members: **Brian Paul**, Steve Ward, Jason Philbrook, Melinda Poore, Kathleen Case, Phil Lindley.

4) Expansion Plan Subcommittee – “How we get there.”

The Expansion Plan Subcommittee will investigate and report on the following:

- a) Determine the needs and goals for penetration of broadband services in Maine;
- b) Recommend a specific broadband expansion plan for the State;
- c) Propose any specific legislative or regulatory vehicles – including any funding or incentive mechanisms – for the implementation of a broadband expansion plan.
- d) Develop measures of success.

Members: **Pat Scully**, Kurt Adams, Janet Yancey-Wrona, Peter Reilly, Jill Goldthwait, Reggie Palmer, Sam Elowitch, Brian Paul, Phil Lindley, Amy Spelke.

APPENDIX D – Other States

- Summary of other states' activities:
 - ConnectKentucky – To bring high-speed internet service to all state residents by 2007.
 - Michigan – LinkMichigan. Economic Development Corp. funding. Michigan Broadband Development Authority, low-cost funding through tax-exempt bonds.
 - Nebraska – Internet Enhancement Fund program, to provide financial assistance to install and deliver broadband throughout the state.
 - Louisiana – LA Broadband Advisory Council
 - California – “Gigabit or Bust.” Tower permitting process for expedited period to permit towers and poles. Digital Divide account, funded from 15% of lease revenues from the use of wireless telecom facilities on state owned land
 - Alaska – DECD grants (\$15million, from USDA)
 - New Hampshire – Municipal bonds for constructing, improving, and acquiring broadband facilities. No. NH Telecommunications Master Plan
 - Vermont – Broadband Council, grant program. Econ. Development Council of No. Vermont, \$10 million project using US Dept. of Commerce and other sources.
 - Kansas – KUSF funds for “KanED” (not just for wireline telcos).
 - Colorado – Multi-Use Network to connect rural areas (grant program).
 - Hawaii – Technology Renovation Tax Credit.
 - Idaho – IDANET to bring broadband to rural areas by aggregating state money and being anchor tenant.
 - Minnesota – Broadband access availability account to provide grants to projects and underserved areas, from surcharges on communications carriers.
 - Mississippi – Broadband Technology Development Act, provides tax credits and sales tax exemptions to companies investing in rural broadband deployment.
 - Montana – Tax Credit for Broadband Investments, 20%.
 - North Carolina – Rural Internet Access Authority, programs and grants.
 - Oregon – Broadband Tax Credit, 20% against personal and corporate income tax.
 - Pennsylvania – The Ben Franklin Technology Development Authority, provides funding for grassroots projects.
 - Tennessee – Rural Internet Access Authority, oversees, manages, and monitors efforts to provide broadband to rural counties.

- Others as needed (Executive Order, membership lists, etc.)

APPENDIX E – Regulatory and Financial Assessment Committee

Chart showing methods of broadband delivery and a review regulatory impacts.

Adobe PDF Chart

Broadband Access Infrastructure Board

Regulatory and Financial Assessment Subcommittee

| Broadband Delivery | Provider | Federal Regulation | State Regulation | Municipal Regulation | Authority to Serve | Taxes |
|---------------------------|--|--|---|---|--|---|
| Dialup | ILEC: Verizon CLEC: Oxford Telephon ISP: GWI, Midcoast Internet Solutions | FCC: 1996 Telecommunications Act | Certificate from MPUC needed; rates not regulated. Some wholesale access regulation | Pole placement and possible siting | Facilities required - Franchise with obligation to serve. Resale -- anyone can serve, no obligation to serve | Personal property, including poles, exempt from local tax, but taxed by state. Rates exceed ave. property tax rate for all Maine communities. |
| DSL | ILEC: Verizon CLEC: Mid Maine Telecom, ISP: GWI, Midcoast Internet Solutions | FCC: 1996 Telecommunications Act Policy Statement (FCC 05-150) - 8/5/05 Title I ancillary jurisdiction | Certificate from MPUC needed; rates not regulated. Continuation (for non-ILECs) dependent upon MPUC "Line Sharing" investigation (Docket 2004-809) and resolution of federal pre-emption issues; Verizon/Skowhegan Online Inc. June 21, 2005 PUC not pre-empted by the FCC, and under state law can require DSL access "unbundling." This case preceded the U.S. Supreme Court Brand X decision which concluded that no access is required for cable systems, and in August 2005 the FCC has extended the Brand X decision to DSL. State Law Court decision and PUC position may be challenged again in light of Supreme Court decision and FCC policy changes. | same as above | Franchise based, but no obligation to provide broadband | DSL includes a 2-way voice channel, and may be exempt from local property tax, but subject to State Telecommunications Personal Property Tax. |
| CATV | Cable provider: Time Warner, Adelphia, Comcast ISP: GWI | FCC: Declaratory Ruling and Notice of Proposed Rulemaking (FCC 02-77) - 3/14/02 FTC: in some instances i.e., AOL Time Warner merger, open access with at least two other non-affiliated ISPs were required | No state regulation | Cable system constructed/ operated per FCC regulations and municipal franchise agreements (consistent with federal law). State law authorizes municipal ordinances over franchise agreements. Under federal law, franchise fees up to 5% on gross receipts from cable TV. Broadband not included. | Franchise based, but no obligation to provide broadband | Personal property is taxed by the municipality at the local rate. |
| Satellite | Dish Network (dishdirec) | | No state regulation | | Franchise based, but no obligation to provide broadband | Data-only broadband equipment would be taxed by municipality. |
| Wireless | Downeast Wireless, Mid Coast Internet Solutions, Pioneer Wireles | FCC: Advanced Wireless Service-1 Service Rules Order (02-353) Service Rules for Advanced Wireless Services in Band 1.7 GHz & 2.1 GHz band Order on Reconsideration (05-149) 8/5/05 Part 15 | State has very limited regulatory authority over wireless "Eligible Telecommunications Carriers" (carriers receiving funds from the Federal Universal Service Fund) - in Maine, these include only RCC (Unicel) and U.S. Cellular | Siting approvals | Anyone can serve, no obligation to serve | Data only: property taxed by municipality. Data & voice (cellular): property taxed by state. Need MRS clarification. |

| Broadband Delivery | Provider | Federal Regulation | State Regulation | Municipal Regulation | Authority to Serve | Taxes |
|--------------------|--|---|--|----------------------|---|---------------------------------|
| BPL | Utility: CMP, Kennebunk Light & Power | FCC: Report & Order (FCC 04-245) - 10/14/04 | MPUC CLEC Certificate needed to provide voice, unless within ambit of FCC "Information Services" definition (Vonage). No rate regulation | Pole placement | Anyone can serve, no obligation to serve | Property taxed by municipality. |
| FTTH | ILEC: Verizon CLEC: Oxford Networks | | Provision by Verizon already within existing regulatory framework; MPUC CLEC certificate needed (for non-ILECs) to provide voice unless within ambit of FCC's "Information Services" definition. | | Franchise based, but no obligation to provide broadband | |

Cable: Declaratory Ruling and Notice of Proposed Rulemaking (FCC 02-77) - 3/14/02

FCC concluded that the cable model service is properly classified as an interstate information service and is therefore subject to FCC jurisdiction. The FCC concluded that it is not a 'cable service' as defined in the Communications Act.

DSL: Report and Order and Notice of Proposed Rulemaking, (FCC 05-150)

wireline broadband Internet access services are defined as information services functionally integrated with a telecommunications component. In the past, the facilities-based providers had to offer wireline broadband transmission component separately as a stand-alone service. It was classified as a telecommunications service. The FCC has eliminated this transmission component sharing requirement, finding it caused vendors to delay development and deployment of innovations. The Order requires these providers continue to provide existing Internet access transmission offerings, on a grandfathered basis, for one year. The Order also requires facilities-based providers to contribute to existing universal service mechanisms based on their current levels of reported revenues for the DSL transmission for a 270-day period after the effective date of the Order or until the FCC adopts new rules, whichever occurs earlier. If the FCC is unable to complete new contribution rules within the 270-day period, the FCC will take whatever action is necessary to preserve funding levels.

Wireless: Service Rules for Advanced Wireless Services in Band 1.7 GHz & 2.1 GHz band Order on Reconsideration (05-149) 8/5/05

- the current order maintains the mixture of license sizes and geographic areas to accommodate the needs of various wireless providers but increases the amount of spectrum licensed on a small geographic basis
- the new band plan splits an original 30 MHz band into two unique bands to facilitate access for new and existing wireless carriers seeking to deploy advanced services, improve service quality and expand coverage areas
- the new order reduces the restrictions on transmitter output power levels

General FCC Info: wireless

- both licensed and unlicensed bands are used to provide wireless broadband
- FCC tests and authorizes all wireless communication and the FCC permits some lower powered devices to operate without first acquiring a license
- two rules apply to all licenses and unlicensed providers: interference protection - unlicensed providers are prohibited from interfering with licensed providers
- radio frequency safety: all equipment sold in these bands must undergo FCC certification to ensure safety compliance

BPL: FCC: Report & Order (FCC 04-245)

- Specifically, the Order by the Commission:
- Sets forth rules imposing new technical requirements on BPL devices, such as the capability to avoid using any specific frequency and to remotely adjust or shut down any unit;
 - Establishes "excluded frequency bands" within which BPL must avoid operating entirely to protect aeronautical and aircraft receivers communications; and establishes "exclusion zones" in locations close to sensitive operations, such as coast guard or rad
 - Establishes consultation requirements with public safety agencies, federal government sensitive stations, and aeronautical stations.
 - Establishes a publicly available Access BPL notification database to facilitate an organized approach to identification & resolution of harmful interference.
 - Changes the equipment authorization for Access BPL systems from verification to certification; and
 - Improves measurement procedures for all equipment that use RF energy to communicate over power lines.

Incentives

- Business Equipment Tax Reimbursement (BETR): Reimburses businesses for local taxes paid on qualified personal property for 12 years. Reimbursement reduced from 100% to 90% in 2005. Regulated utilities ineligible by statute.
- Employment Tax Increment Financing (ETIF): Reimburses qualified businesses a percentage (35-80%) of their qualified employees' state income tax withholdings for 10 years. Public utilities ineligible by statute.
- High Technology Investment Tax Credit (HTITC): A credit equal to 100% of the basis of qualified computer, Internet and advanced telecomm equipment. Generally limited to \$100,000/year, with 5-year carryforward, though exceptions may apply.
- Municipal Tax Increment Financing (TIF): Encourages municipalities to use property taxes from new investment to assist with project financing. Telecomm equipment, however, is taxed by the state and provides no local revenues for TIF use.

| Broadband Delivery | Incentives | Joint Use | Rights of Way | Certifications | Affiliate Issues | Infrastructure Costs /Price |
|--------------------|---|---|---|----------------|-----------------------|---|
| Dialup | Regulated utilities are ineligible for Business Equipment Tax Reimbursement (BETR) and Employment Tax Increment Financing (ETIF). Property is taxed by state and ineligible for municipal Tax Increment Financing (TIF). Eligible for High Technology Investment Tax Credit (HTITC). | Maine joint use statute/Chapter 880 governing access and rates, to extent not inconsistent with FCC/TelAct. PPA/TelAct provides guidance and will apply where state does not govern. Focus on CLECs and CATVs | Requires adequate property rights-license, fee, or easements; i.e., rights need to include info services. | | Facilities--MPUC Regs | Price: \$10-15/mo Copper Wires: \$7,000 - \$15,000km |
| DSL | Regulated utilities are ineligible for BETR and ETIF. Property is taxed by the state and ineligible for municipal TIF. These utilities ARE eligible for the High Technology Investment Tax Credit (HTITC). | Same as above | Requires adequate property rights-license, fee, or easements; i.e., rights need to include info services. | | MPUC Regs | Price: \$15-30 Copper Wires: \$7,000 - \$15,000km Yearly Avg. Cost: \$850 including capex & opex |
| CATV | Excluded from the BETR program. Eligible for ETIF, municipal TIF. Eligible for HTITC if providing Internet access services | Same as above | Requires adequate property rights-license, fee, or easements; i.e., rights need to include info services. | | None | Price:\$30-50 Coaxial Cable: \$12,000 - \$20,000/km Yearly Avg. Cost: \$1000 including capex & opex |
| Satellite | Eligible for BETR (direct satellite TV excluded), HTITC, municipal TIF. | | Requires adequate property rights-license, fee, or easements; i.e., rights need to include info services. | | None | Price: \$80-150/mo Yearly Avg. Cost: \$2200 including capex & opex |
| Wireless | Data only: eligible for BETR, HTITC, ETIF, TIF. Data & voice (cellular): Excluded from BETR, municipal TIF. Need MRS clarification. | Same as above for wireless equipment | not needed | | None | Price: \$25-50 Wireless: \$3,500 - \$15,000/km |

| Broadband Delivery | Incentives | Joint Use | Rights of Way | Certifications | Affiliate Issues | Infrastructure Costs /Price |
|--------------------|---|---|---|----------------|---|--|
| BPL | Regulated utilities ineligible for BETR and ETIF. Non-utilities potentially eligible for BETR and ETIF. Eligible for municipal TIF. May be eligible for HTITC. | To extent information service provider not covered by FCC/TelAct. State does not presently govern but might choose to govern if not preempted by federal law. | not needed | | MPUC Regs. Likely requires an affiliate if electric utility and considered a non-core activity. | Price: \$25-40 Yearly Avg. Cost:\$500-800 (est. from Idacomm) |
| FTTH | | See (1) above | Requires adequate property rights-license, fee, or easements; i.e., rights need to include info services. | | MPUC regs for telephones | Fiber Optics; \$22,000 - \$35,000/km |

Source: US Internet industry assoc., Allen Consulting Group, Canadian Broadband Taskforce Report

GLOSSARY

BAIB (Broadband Access Infrastructure Board) a body of appointees of the governor charged with issuing recommendations in support of the data connectivity portion of the Connect Maine program.

BPL broadband over power lines a technique for delivering high-speed Internet access over electrical power lines, with the ability to use house wiring to connect to computers.

Broadband an elastic term describing high-bandwidth data connections. The wider the pipe, the more data can be moved at the same time and hence the higher the effective speed. The FCC defines any connection greater than 200 kilobytes per second in one direction as “broadband” and a connection with 200kbps in both directions as “advanced broadband,” but these figures are almost universally deemed to be out-of-date. A typical broadband connection today is closer to 512kbps upstream and 2Mbps down and moves upward from there. In a few years, that number is likely to be significantly higher. The term “broadband” is often used as shorthand for “high-speed Internet access.”

business user a user in a business setting constituting a broad “middle class” in terms of bandwidth, reliability, and security needs. See also *home user*, *enterprise user*.

cable internet a means of delivering broadband via coaxial cables, almost always simultaneously with cable television service.

central office this is a switching station maintained by an ILEC where DSLAMs are generally deployed and from which the maximum range of DSL service (reckoned in “circuit feet,” distances over twisted-pair copper lines, not “as the crow flies”) can be determined.

CLEC Competitive Local Exchange Carrier

ConnectMaine, the Governor's initiative to expand cellular and broadband coverage.

DS3 a digital signal carrier with a rate of 44.736Mbps.

DSL digital subscriber line. There are many subtypes of DSL (VDSL, HDSL, etc.) of varying speed, range, and technical characteristics.

DSLAM digital subscriber access multiplexer.

enterprise user the most demanding, industrial strength broadband consumer that usually represents large, technology-intensive organizations.

fixed wireless a non-mobile method of delivering broadband service.

FTTH/FTTP fiber to the premises, home, et al. a method of connectivity using fiber optic cabling.

home user the class of broadband consumer with the least demanding broadband needs but which also faces total unavailability of service in many areas

ILEC Incumbent Local Exchange Carrier

interregional connectivity the process of bridging a particular regional node to the Internet backbone.

intraregional connectivity the process of bridging a particular node to points within a region or town.

last mile a term for the most remote and sparsely populated areas that are among the most challenging to provide with broadband

municipal network a broadband network owned and operated by a city or town, often by lease arrangement with an ILEC/CLEC. The right of Maine communities to establish these networks was recently reaffirmed by the State Legislature.

narrowband low-speed data connections (such as dialup Internet access, which tops out at 56kbps and is generally even lower in real-world applications).

OCx Optical Carrier service provided over fiber optic cable

PON passive optical networking a family of networking standards using a point-to-multi-point architecture for delivering last-mile connectivity without any active (i.e., powered) components in the distribution network. PON may provide hope for a last-mile solution because it involves fewer upgrades to the current infrastructure than competing technologies.

symmetrical/asymmetrical describes whether a data connection operates at the same speed when traveling upstream as it does when traveling downstream. A symmetrical connection is the same speed up or down; an asymmetrical connection is usually slower on the upload than on the download.

synchronous/asynchronous describes whether a communications stream is completely continuous (synchronous), or can occur at any time and at irregular intervals (asynchronous). Most connections between computers, including those connected via broadband, are asynchronous.

take rate or penetration, a measure of the ratio of potential subscribers to whom service is available to those who actually sign up for that service.

triple threat an emerging application of broadband that delivers voice, data, and video over the same pipe

WiFi wireless fidelity a very popular form of wireless networking in the IEEE 802.11x family of standards that is generally used for connectivity of wireless large-area networks (WLANs) inside buildings and small outdoor areas, but which has shown remarkable usefulness as a way of providing high-speed Internet over wider distances via towers, high-gain antennae, and mesh-network technologies that significant exceeds what WiFi was originally intended to do.

WiMAX Wireless Interoperability for Microwave Access a newly ratified form of fixed wireless broadband access in the IEEE 802.16x family of standards. The licensed version has a theoretical range and distance of up to 30 miles and 50Mbps or higher but is only available to the larger carriers. WiMAX is said to be able to overcome some of the topographical issues faced by other forms of wireless broadband, but this has not yet come to the marketplace.